7. REGULATIONS AND ADVISORIES

The national and state regulations and guidelines pertaining to 1,4-dichlorobenzene in air, water, and other media are summarized in Table 7-1.

ATSDR has derived an acute inhalation MRL of 0.8 ppm for 1,4-dichlorobenzene based on a NOAEL of 300 ppm based on the absence of significant developmental effects in rabbits (Hayes et al. 1985).

ATSDR has derived an intermediate-duration (15 to 364 days) inhalation MRL of 0.2 ppm for 1,4-dichlorobenzene based on a NOAEL for the absence of liver effects in rats (Hollingsworth et al. 1956).

ATSDR has derived a chronic-duration (365 days or more) inhalation MRL of 0.1 ppm for 1,4-dichlorobenzene based on based on the absence of liver effects in rats (Riley et al. 1980).

ATSDR has derived an intermediate duration (15 to 364 days) oral MRL of 0.4 mg/kg/day for 1,4-dichlorobenzene based on a LOAEL for the absence of liver effects in rats (Hollingsworth et al. 1956).

The EPA inhalation reference concentration (RfC) for 1,4-dichlorobenzene is 0.8 mg/m^3 (IRIS 1998). EPA's Office of Water notes a reference dose concentration of 0.1 mg/kg/day in its health advisory for 1,4-dichlorobenzene (EPA 1996).

The health advisory from EPA's Office of Water also classifies 1,4-dichlorobenzene as C (possibly carcinogenic to humans) (EPA 1996). The International Agency for Research on Cancer (IARC) has classified 1,4-dichlorobenzene as a Group 2B carcinogen; possibly carcinogenic to humans (IARC 1987). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies 1,4-dichlorobenzene as A3 which indicates that the chemical is carcinogenic in experimental animals when administered at a relatively high dose (ACGIH 1996). Studies conducted by the National Toxicology Program showed clear evidence of carcinogenicity in male rats and both male and female mice (NTP 1995).

1,4-Dichlorobenzene is on the list of chemicals subject to the requirements of "The Emergency Planning and Community Right-to-Know Act of 1986 [EPCRA] (EPA 1988c). Section 313 of Title III of EPCRA, requires owners and operators of certain facilities that manufacture, import, process, or otherwise use the

chemicals on this list to report annually their release of those chemicals to any environmental media (U.S. Congress 1986).

OSHA requires employers of workers who are occupationally exposed to 1,4-dichlorobenzene to institute engineering controls and work practices to reduce and maintain employee exposure at or below the permissible exposure limit (PEL). The employer must use controls and practice, if feasible, to reduce exposure to or below an 8-hour time-weighted average (TWA) of 75 ppm (OSHA 1974). The 8-hour TWA is applicable to any 8-hour shift of a 40-hour work week. OSHA has not established a ceiling value; an exposure limit which must not be exceeded at any time for 1,4-dichlorobenzene.

The EPA regulates 1,4-dichlorobenzene under the Clean Air Act (CAA) and has designated 1,4-dichlorobenzene as a hazardous air pollutant (HAP) (U.S. Congress 1990; EPA 19941). The major source category for which 1,4-dichlorobenzene emissions are controlled is the synthetic organic chemicals manufacturing industry (SOCMI)--equipment leaks (EPA 1983a) and process vents, storage vessels, transfer operations, and waste water (EPA 1994j).

1,4-Dichlorobenzene is regulated by the Clean Water Effluent Guidelines in Subchapter N of Title 40 of the Code of Federal Regulations. Electroplating is the points source category for which 1,4-dichlorobenzene is controlled as a total toxic organic (EPA 1981b). The point source categories for which 1,4-dichlorobenzene has a specific regulatory limitation include steam electric power generation (EPA 1982d), metal finishing (EPA 1983d), and organic chemicals, plastics, and synthetic fibers (EPA 1987c, 1987d, 1987e, 1987f, 19878, 1987h, 19871, 1987j, 1987k). The World Health Organization (WHO) has not established a recommended drinking-water guideline value for chlorobenzenes. WHO guideline values are indicators of tolerable concentrations for drinking water, but are not to be interpreted as defining target levels for water quality. Where aesthetic properties are concerned, the WHO recommends a threshold odor concentration of 1 μg/L for 1,4-dichlorobenzene (WHO 1984a).

The Resource Conservation and Recovery Act (RCRA) identifies 1,4-dichlorobenzene as the hazardous constituent in various hazardous wastes. 1,4-Dichlorobenzene is the basis for listing waste assigned the hazardous waste codes F024 and F025 (EPA 1981c). It is also the regulated constituent in hazardous wastes assigned the waste codes F039 and U072 (EPA 1988b). The treatment standard for waste water

containing 1,4-dichlorobenzene is 0.090 mg/L. For nonwaste water the treatment standard for 1,4-dichlorobenzene is 6.0 mg/kg (EPA 1997)

Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) owners of vessels or facilities are required to immediately report release of 1,4-dichlorobenzene equal to or greater than the reportable quantity of 100 pounds (45.4 kg) (EPA 1985b).

Table 7-1. Regulations and Guidelines Applicable to 1,4-Dichlorobenzene

Agency	Description	Information	References
INTERNATIONAL			
Guidelines:	Carcinogenic classification	Group 2B[a]	IARC 1987
IARC			
WHO	Drinking-water guideline values-chemicals of health significance	300 µg/L	WHO 1996
	Aesthetic quality threshold odor concentration	1 µg/L	WHO 1984a
NATIONAL			
Regulations: a. Air:			
OSHA	Air contaminants		
	Permissible exposure limit (PEL) 8-hr. Time weighted average (TWA)	75 ppm (450 mg/m^3)	29 CFR 1910.1000 OSHA 1974[b]
	Vacated 1989 OSHA Short-term exposure limit (STEL)	110 ppm (675 mg/m^3)	54 FR 2332 OSHA 1989 58 FR 35338 OSHA 1993
EPA OAR	Hazardous Air Pollutants	Yes	Clean Air Act Amendment Title III, Section 112 (b) U.S. Congress 1990
	Standards of Performance for New Stationary Sources-		
	Subpart VV: Equipment leaks of VOCs in the Synthetic Organic Chemicals Manufacturing Industry (SOCMI)--chemicals produced by affected facilities	Yes	40 CFR 60.489 EPA 1983a
	National Emission Standards for Hazardous Air Pollutants for Source Categories		
	Subpart F: National Emission Standards for Organic Hazardous Air Pollution from the Synthetic Organic Chemical Manufacturing Industry	Yes	40 CFR 63.106 EPA 1994i
	Subpart G: National Emission Standards for Organic Hazardous Air Pollutants from the SOCMI for Process Vents, Storage Vessels, Transfer Operations, and Wastewater	Yes	40 CFR 63.110, Appendix, Table 9 EPA 1994j

Table 7-1. Regulations and Guidelines Applicable to 1,4-Dichlorobenzene (continued)

Agency	Description	Information	References
NATIONAL (cont.)			
b. Water			
EPA ODW	National Primary Drinking Water Regulations		
	Subpart D: Reporting, Public notification and Recordkeeping		
	Enforceable drinking water standard	0.075 ppm	40 CFR 141.32 EPA 1987b
	Subpart G: National Revised Primary Drinking Water regulations		
	Maximum contaminant levels for organic chemicals	0.075 mg/L	40 CFR 141.61 EPA 1991j
	BAT for organic contaminants listed in 40 CFR 141.61 (a) and (g)	GAC PTA	40 CFR 141.61 EPA 1991j
	National Primary Drinking Water Regulations Implementation		
	Subpart G: Identification of best technology, treatment techniques or other means generally available		
	Variances and exemptions from the maximum contaminant levels for organic and inorganic chemicals	Yes	40 CFR 142.62 EPA 1991k
EPA OW	Designation of Hazardous Substances		
	List of hazardous substances	Yes	40 CFR 116.4 EPA 1978
	Determination of Reportable Quantities for Hazardous Substances		
	RQ of hazardous substances designated pursuant to Section 311 of the CWA (dichlorobenzene)	100 pounds (45.4 kg)	40 CFR 117.3 EPA 1985b
	EPA Administered Permit Programs: The NPDES-		
	Organic toxic pollutants in each of four fractions in analysis by GC/MS	Yes	40 CFR 122, App. D EPA 1983c
	Criteria and Standards for the NPDES-		

Table 7-1. Regulations and Guidelines Applicable to 1,4-Dichlorobenzene (continued)

Agency	Description	Information	References
NATIONAL (cont.)	Instructions for Form 2C, application for permit to discharge wastewater--hazardous substances (dichlorobenzenes)	Yes	40 CFR 125 EPA 1984a
	Methods for organic chemical analysis of municipal and industrial wastewater (Methods 601, 602, 612, 624, and 1625)	Yes	40 CFR 136, App. A EPA 1984b
	Designated as a toxic pollutant under Section 307 (a)(1) of the Federal Water Pollution Control Act	Yes	40 CFR 401.15 EPA 1979
	General pretreatment regulations for existing and new sources of pollution-		
	List of toxic pollutants	Yes	40 CFR 403, App. B EPA 1986d
	Electroplating Point Source Category-		
	General definition	Yes	40 CFR 413.02 EPA 1981b
	Organic Chemicals, Plastics, and Synthetic fibers		
	Subpart B-Rayon Fibers-PSES		
	Maximum for any one day Maximum for monthly average	380 µg/L 142 µg/L	40 CFR 414.25 EPA 1987c
	Subpart C-Other Fibers-PSES		
	Maximum for any one day Maximum for monthly average	380 µg/L 142 µg/L	40 CFR 414.35 EPA 1987d
	Subpart D-Thermoplastic Resins-PSES		
	Maximum for any one day Maximum for monthly average	380 µg/L 142 µg/L	40 CFR 414.45 EPA 1987e
	Subpart E-Thermosetting Resins		
	Maximum for any one day Maximum for monthly average	380 µg/L 142 µg/L	40 CFR 414.55 EPA 1987f
	Subpart F-Commodity Organic Chemicals		
	Maximum for any one day Maximum for monthly average	380 µg/L 142 µg/L	40 CFR 414.65 EPA 1987g

Table 7-1. Regulations and Guidelines Applicable to 1,4-Dichlorobenzene (continued)

Agency	Description	Information	References
NATIONAL (cont.)	Subpart G-Bulk Organic Chemicals-PSES		
	Maximum for any one day	380 µg/L	40 CFR 414.75
	Maximum for monthly average	142 µg/L	EPA 1987h
	Subpart H-Speciality Organic Chemicals--PSES		
	Maximum for any one day	380 µg/L	40 CFR 414.85
	Maximum for monthly average	142 µg/L	EPA 1987i
	Subpart I-Direct Discharge Point Sources that Use End-of-Pipe Biological Treatment-effluent limitations: BAT and NSPS		
	Maximum for any one day	28 µg/L	40 CFR 414.91
	Maximum for monthly average	15 µg/L	EPA 1987j
	Subpart J-Direct Discharge Point Source That Do Not Use End-of Pipe Biological Treatment-effluent limitations: BAT and NSPS		
	Maximum for any one day	380 µg/L	40 CFR 414.101
	Maximum for monthly average	142 µg/L	EPA 1987k
	Steam Electric Power Generating Point Source Category		
	Pretreatment standards for new sources (PSNS)		
	Maximum for any time	0 mg/L	40 CFR 423.17 EPA 1982d
	List of 126 priority pollutants	Yes	40 CFR 423, App. A EPA 1982d
	Metal Finishing Point Source Category		
	Metal finishing subcategory-Definition of total toxic organics (TTO)	Yes	40 CFR 433.11 EPA 1983d
	Pesticide Chemicals		
	Subpart D-Test Methods for Pesticide Pollutants		
	BAT and NSPS effluent limitations for priority pollutants for direct discharge point sources that use end-of-pipe biological treatment		
	Daily maximum		
	Monthly average	28 µg/L 15 µg/L	40 CFR 455.50, Table 4 EPA 1993

Table 7-1. Regulations and Guidelines Applicable to 1,4-Dichlorobenzene (continued)

Agency	Description	Information	References
NATIONAL (cont.)	BAT and NSPS effluent limitations for priority pollutants for direct discharge point sources that do not use end-of-pipe biological treatment		
	Daily maximum	380 µg/L	40 CFR 455.50, Table 5 EPA 1993
	Monthly average	142 µg/L	
	PSES and PSNS for priority pollutants		
	Daily maximum	380 µg/L	40 CFR 455.50, Table 6 EPA 1993
	Monthly average	142 µg/L	
	Ambient Water Quality Criteria For the Protection of Human Health:		
	Ingestion of water and aquatic organisms	0.04 µg/L	IRIS 1998
	Ingestion of fish only	$2.0x10^{+3}$ µg/L	
c. Other:			
DOT	Hazardous Materials Table	UN 1592	49 CFR 172.101 DOT 1990a
	Hazardous Substances Other Than Radionuclides: RQ	100 pounds (45.4 kg)	49 CFR 172.101, App. A DOT 1990b
	List of Marine Pollutants	Yes	49 CFR 172.101, App. B DOT 1990c
EPA-OERR	List of Hazardous Substances and Reportable Quantities	100 pounds (45.4 kg) (statutory)	40 CFR 302.4 EPA 1985c
		100 pounds (45.4 kg) (final RQ)	
	Toxic Chemical Release Reporting: Community Right-to-know		
	Specific toxic Chemical Listings	Yes	40 CFR 372.65 EPA 1988c
EPA-OSW	Criteria for Classification of Solid Waste Disposal Facilities and Practices		
	Maximum contaminant levels promulgated under the Safe Drinking Water Act	0.075 mg/L	40 CFR 257, App. I EPA 1991l

Table 7-1. Regulations and Guidelines Applicable to 1,4-Dichlorobenzene (continued)

Agency	Description	Information	References
NATIONAL (cont.)	Criteria for Municipal Solid Waste Landfills		
	Constituents for detection monitoring	Yes	40 CFR 258, App. I EPA 1991d
	List of hazardous inorganic and organic constituents	Yes	40 CFR 258, App. II EPA 1991e
	Identification and Listing of Hazardous Wastes		
	Subpart B: Criteria for Identifying the Characteristics of Hazardous Waste and for Listing Hazardous Waste		
	Maximum concentrations of contaminants for the toxicity characteristic	7.5 mg/L (regulatory level)	40 CFR 261.24 EPA 1990a
	Subpart D: Lists of Hazardous Wastes		
	Discarded commercial products, off-specification species, container residues, and spill residues	Yes	40 CFR 261.33 EPA 1980b
	Chemical Analysis Test Methods	Yes	40 CFR 261, App. III EPA 1983e
	Basis for Listing Hazardous Waste	F024, F025	40 CFR 261, App. VII EPA 1981c
	Hazardous Constituents	U072	40 CFR 261, App. VIII EPA 1988b
	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities		
	Ground-water monitoring list	Yes	40 CFR 264, App. IX EPA 1987l
	Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities		
	Reference air concentrations	10 mg/m^3	40 CFR 266, App. IV EPA 1991f
	Health-based limits for exclusion of waste-derived residues	$7.5x10^{-2}$	40 CFR 266, App. VII EPA 1991g
	Land Disposal Restrictions-		

Table 7-1. Regulations and Guidelines Applicable to 1,4-Dichlorobenzene (continued)

Agency	Description	Information	References
NATIONAL (cont.)	Subpart B: Schedule for land disposal prohibition and establishment of treatment standards	Yes	40 CFR 268.12 EPA 1986e
	Subpart C: Prohibitions on land disposal	Yes	40 CFR 268.35 EPA 1990b
	Subpart D: Treatment standards for hazardous waste (regulated constituent F039 and U072 wastes)--Technical amendment to final rule: 40 CFR 268.40	Wastewater 0.090 mg/L Nonwastewater 6.0 mg/kg	62 FR 7502 EPA 1997a
	Universal treatment standards--Technical amendment to final rule: 40 CFR 268.40	Wastewater 0.090 mg/L Nonwastewater 6.0 mg/kg	62 FR 7502 EPA 1997a
	List of halogenated organic compounds regulated under 268,32	Yes	40 CFR 268, App. III EPA 1987m
	Organometallic lab packs	Yes	40 CFR 268, App IV EPA 1991h
EPA OPPTS	Chemical Information Rules		
	Chemical lists and reporting periods	Yes	40 CFR 712.30 EPA 1982b
	Health and Safety Data Reporting		
	Affected substances and mixtures	Yes	40 CFR 716.120 EPA 1988d
Guidelines:			
a: Air:			
ACGIH	Permissible Exposure Limit (PEL)-Time-weighted Average (TWA)	10 ppm (60 mg/m^3)	ACGIH 1998
b. Water: EPA OW	1-d Health Advisory (child)-draft	10 mg/L	EPA 1996
	10-d Health Advisory (child)-draft	10 mg/L	
	Lifetime Health Advisory (adult)-	0.075 mg/L	
	Longer-term Health Advisory-draft	10 mg/L (child) 40 mg/L (adult)	
	RfD	0.1 mg/kg/day	
	Maximum contaminant level (MCL)	0.075 mg/L	

Table 7-1. Regulations and Guidelines Applicable to 1,4-Dichlorobenzene (continued)

Agency	Description	Information	References
NATIONAL (cont.)	Maximum contaminant level goals (MCLGs) for organic contaminants	0.075 mg/L	
	Ambient Water Quality Criteria for Human Health		IRIS 1998
	water and fish	0.4 mg/L	
	fish only	2.6 mg/L	
d. Other:			
ACGIH	Chemical Substance and other Issues Under Study	Yes	ACGIH 1996
	Cancer classification	A3[c]	
EPA	Cancer classification	C[d]	EPA 1996
STATE			
Regulations and Guidelines:			
a. Air:	Average Acceptable Ambient Air Concentrations		NATICH 1992
AZ	1 hour	$2.5x10^{+2}$ µg/m^3	
	24 hours	$6.6x10^{+1}$ µg/m^3	
	Annual	$1.8x10^{-1}$ µg/m^3	
CT	8 hours	$9.00x10^{+3}$ µg/m^3	
FL-Pinella	8 hours	$4.5x10^{+3}$ µg/m^3	
	24 hours	$1.08x10^{+3}$ µg/m^3	
	Annual	$7.00x10^{-1}$ µg/m^3	
IN	8 hours	$2.25x10^{+3}$ µg/m^3	
LA	8 hours	$1.07x10^{+4}$ µg/m3	
MA	24 hours	$1.25x10^{+2}$ µg/m^3	
	Annual	$1.8x10^{-1}$ µg/m^3	
NC	15 minutes	$6.6x10^{+1}$ mg/m^3	
NC-Forsyth County	15 minutes	6.6 mg/m^3	
ND	1 hour	6.61 mg/m^3	
	8 hours	4.51 mg/m^3	
NV	8 hours	$1.07x10^{+1}$ mg/m^3	
OK	24 hours	$9.0x10^{+3}$ µg/m^3	
SC	24 hours	$4.50x10^{+3}$ µg/m^3	
TX	30 minutes	$1.08x10^{+3}$ µg/m^3	
	Annual	$4.50x10^{+2}$ µg/m^3	
VA	24 hours	$7.50x10^{+3}$ µg/m^3	

Table 7-1. Regulations and Guidelines Applicable to 1,4-Dichlorobenzene (continued)

Agency	Description	Information	References
STATE (cont.)			
WA-SWEST	24 hours	$1.50x10^{+3}$ µg/m^3	
b. Water	Water Quality Criteria: Human Health		
AL	Drinking water (standard)	75 µg/L	FSTRAC 1995
AZ	Drinking water (guideline)	75 µg/L	
CA	Drinking water (standard)	5 µg/L	
CT	Drinking water (guideline)	75 µg/L	
MA	Drinking water (guideline)	5 µg/L	
ME	Drinking water (guideline)	27 µg/L	
MN	Drinking water (guideline)	10 µg/L	
WI	Drinking water (standard)	75 µg/L	

[a] Group 2B defines the agent as possibly carcinogenic to humans. The category is generally used for agents for which there is limited evidence in humans in the absence of sufficient evidence in experimental animals.

[b] A U.S. Court of Appeals rescinded the 1989 PELs promulgated by OSHA. Only PELs in place prior to the 1989 rule are currently allowed (58 FR 335338).

[c] Cancer classification A3 indicates that the agent is carcinogenic in experimental animals at a relatively high dose.

[d] Chemicals in cancer category C are considered possible human carcinogens. There is limited evidence from animal studies and inadequate or no data in humans

ACGIH = American Conference of Governmental Industrial Hygienists; BAT = Best Available Technology Economically Achievable; CFR = Code of Federal Regulations; CWA = Clean Water Act; DOT = Department of transportation; EPA = Environmental Protection Agency; FSTRAC = Federal State Toxicology and Regulatory Alliance committee; IARC = International Agency for Research on Cancer; LOQ = Limit of Quantitation; MCL = Maximum contaminant Level; MCLG = Maximum Contaminant Level Goal; NATICH = National Air Toxics Information Clearinghouse; NIOSH = National Institute of Occupational Safety and Health; NPDES = National Pollution Discharge Elimination System; NSPS = New Source Performance Standards; OAR = Office of Air and Radiation; ODW = Office of Drinking Water; OERR = Office of Emergency and Remedial Response; OSHA = Occupational Safety and Health Administration; OSW = Office of Solid Wastes; OPPTS = Office of Prevention, Pesticides, and Toxic Substances; OW = Office of Water; PTA = Packed Tower Aeration; PEL = Permissible Exposure Limit; PSES = Pretreatment Standards for Existing Sources; PSNS = Pretreatment Standards for New Sources; RfD = Reference Dose; RQ = Reportable Quantities; SOCMI = Synthetic Organic Chemicals Manufacturing Industry; STEL = Short-term exposure Limit; TTO = Total Toxic Organic; TWA = Time-weighted Average; VOC = Volatile Organic Compound; WHO = World Health Organization